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Attractiveness And Feeding Ability Of Coccinella Sp. On Pellet Added Natural Preservative.

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ABSTRACT

Pellet is an artificial diet formulation as a supplement to predators *Coccinella* sp (Coleoptera: Coccinellidae). The addition of preservatives will increase pellet durability and might affect the feeding ability of predators. The study was conducted at the Pests Laboratory, Faculty of Agriculture, Hasanuddin University, aims to determine the effect of natural preservative in pellets to the attractiveness and feeding ability of *Coccinella* sp. The experiment was arranged in Completely Randomized Design, consisting of nine treatments, each of them was repeated four times. Pellets made from raw material and other ingredients then added natural preservatives in flour form as a treatment such as: the control [without preservative]; babadotan; sambiloto; turmeric; ginger; babadotan+turmeric; babadotan+ginger; sambiloto+turmeric; and sambiloto+ginger, respectively. The results was showed that the attractiveness of predator known from feeding frequency of adult females is highest in pellet given Sambiloto+Ginger is 19.25 times and male in pellet given Sambiloto+Turmeric in 10 times. Feeding ability of *Coccinella* sp. adults were highest in pellet added sambiloto+turmeric is 6.75 mg.

Keywords: predator, feeding frequency, sambiloto, babadotan, turmeric, ginger

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INTRODUCTION

Coccinellids (Coccinella sp.) as potentially predator for controlling various plant pests such as soybean aphids and green leafhopper At the moment, the population in field was decreased due to various factors, such as misunderstanding of cultivation practices. Conservation and augmentation is a good solution to improve the conditions of these predators. Additional of supplement food is one of natural enemies conservation, through management of flowering plants around the planting, spraying of honey solution and artificial food [1]. Artificial food can be prepared in various formulations such as pellets, crumbs, granules, flour (meal or mask), and sheet (flake).

During this time, the use of pellets known as food for livestock and fish, but there are no studies on utilization of pellets as artificial food for predators. Nurariaty et al., was conducted several studies on artificial food for predator Coccinella sp. Today is still need studies until the food have been made in pellets form can be kept longer for commercial purposes. It will be a positive influence on the predators development and growth, also effective to control pests in field. Feeding ability was influenced by the type of predator feed or prey, size and quality of the food/prey, development stage and sex of predators. Feeding ability was positively correlated with the production of eggs of some species Coccinellids [2,3,4,5] reported that the feeding ability of predator Coccinella sp. on artificial diet in the crumbs formulation was highest when females together with males [9:43 mg], then the females alone (7:53 mg), and the male itself (5:03 mg).

Artificial food or artificial diet can only survive a few days without being stored in refrigerator. The artificial food of Coccinella sp. which crumbs formulation can survive only for 7.67 days, was shorter than in the pellets formulation which is an average of 18 days [6]. Therefore require the addition of an antimicrobial preservative in pellet for long purposes and few of weedy plants has potential as natural preservative. According [7], addition a preservative, besides as antimicrobial also useful as antioxidant and reduce the food content moisture.

Previous research indicates some weedy plants are useful as antimicrobial, such babadotan, Ageratum conyzoides L. contain secondary metabolites such as terpenoids and phenolic, obtained from the methanol extract of the leaves and roots act as antifungal against Candida albicans [8] and Trychophyton mentagrophytes [9] as antibacterial against Staphylococcus aeureus [10]. Likewise, the boiling water of sambiloto, Andrographis paniculata Ness. were able to suppress the growth of Alternaria passiflorae [11], an extract of turmeric, Curcuma domestica Val. which can inhibit the growth of the fungus Alternaria porri Ellis [12]. In vitro, ginger rhizome extract, Curcuma sp. as antibacterial can inhibit the growth of Bacillus subtilis, Escerechia coli and Staphylococcus aureus [13].

The processed plant ingredients if added into the pellets will be expected to the interests of insects for oviposition or feeding on plants. Although pellets can last a long time, but if it is not preferred by predators it will interfere with the process of Coccinella sp. conservation. Based on this information, it is necessary a study to determine the effect of various types of antimicrobial plant to pellet against the attractiveness and feeding ability of Coccinella sp.

MATERIAL AND METHODS

The study was conducted at the Pests Laboratory, Department of Plant Pest and Disease, Faculty of Agriculture, Hasanuddin University, Makassar.

Materials Preparation:

Larvae or pupae of Coccinella sp. was obtained from rice crops and reared in the laboratory by providing artificial food on crumbs formulation. Adults thus formed is then used for testing. Plant materials such as leaves and rhizomes were cut, washed, dried and then pulverized into flour. Subsequently the flour [according to treatment] mixed with basic ingredients such as flour of ulat hongkong to make artificial food. In addition to preservatives, also provided other additives such as towing agents, adhesives, and others. The materials are mixed and then made pellets with an average weight of 10 mg (10-15 mm long, 5-6 mm diameter).

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The experiment was arranged in Completely Randomized Design, consisting of nine treatments, each of which was repeated four times. The treatment is a basic ingredient and other additive ingredients are added with natural preservatives, among others: control (without natural preservatives); babadotan; sambiloto; turmeric; ginger; babadotan+turmeric; babadotan+ginger; sambiloto+turmeric and sambiloto+ginger.

The attractiveness of the Predator Coccinella sp. against Pellet:

The observations of attractiveness predators to feed pellets known based on the visiting frequency in each treatment pellets. It was done by putting one pellet in petridish (diameter 9 cm) lined with sterile filter paper of each treatment. Furthermore, a pair of adult predators inserted into the middle of the petridish and 10 percent sugar solution in a sponge The frequency of visits is calculated when the predators first visited pellets up to 48 hours.

Feeding Ability of Predator:

Feeding ability adults of Coccinella sp. known by inserting a pellet in a petridish covered with sterile leaves, then put a pair of predators and sugar solution on a sponge. Observations conducted over three days with pellets weighing early (before the predator inserted) minus the weight of the pellets remaining in each treatment.

Data analysis:

The experiment was arranged in Completely Randomized Design. If there is a significance difference at the ANOVA, then continued with HSD test.

RESULTS AND DISCUSSION

The attractiveness of the Predator Coccinella sp. against Pellet:

The average of visit frequency of Coccinella sp. into the pellet can be seen in Table 1. Analysis of variance was showed there are very significantly differences between the treatment of visit frequency of male and significantly differences in females.

Table 1 shows that the visit frequency of males is highest in the given pellet sambiloto+ginger as much as 10 times and the lowest in turmeric which is only 3.25 times. Meanwhile, the females was highest in the given pellet sambiloto+turmeric as much as 19.25 times and lowest in control that only 5 times.

Table 1: Average of Visit Frequency Coccinella sp. Adults

Treatments	Visit Frequency [times]	
	Male	Female
Control	6.25b	5.00a
Babadotan	4.50ab	5.25a
Sambiloto	6.00b	6.25a
Ginger	3.25a	5.75a
Turmeric	5.00b	9.25ab
Babadotan+Ginger	8.50 c	11.75b
Babadotan+Turmeric	5.00b	8.25ab
Sambiloto+Ginger	8.75c	19.25b
Sambiloto+Turmeric	10.00c	12.75b

Feeding Ability of Predator:

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The average of adult feeding ability to pellets by the known weight of the pellets are eaten for three days can be seen in Figure 1. Analysis of variance was showed that there were significantly differences among the treatments. Figure 1 was showed the ability of the predators feed pellets was highest in the treatment of sambiloto+turmeric is 6.75 mg, then the pellets are added babadotan+ginger and sambiloto+ginger, is 6 mg, respectively.

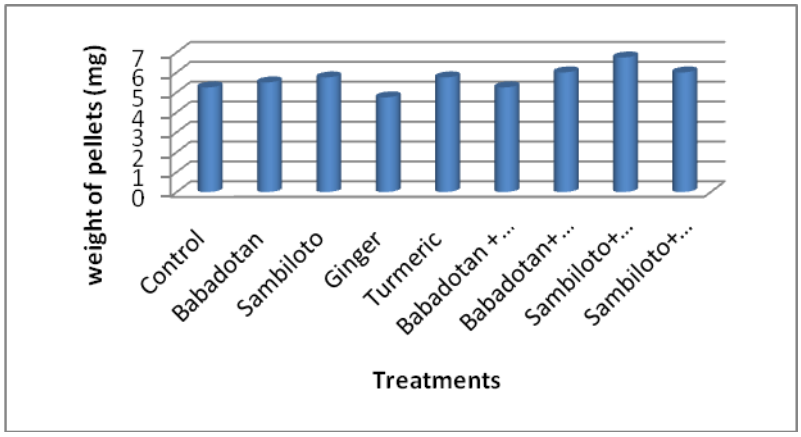

Figure 1: Average of Predator Feeding Ability on Pellet

DISCUSSION

Table 1 shows that Coccinella sp. adults, especially of females are more interested in pellets mixed with sambiloto+turmeric, while the male more interested in pellets mixed sambiloto+ginger. Predatory interest in pellets containing sambiloto leaf flour mixed with turmeric or ginger because pellets produced yellowish green color similar to their natural prey such as soybean aphids (A. glycines) and green leafhopper. The primary components of the dye or pigment in turmeric is curcumin approximately 2-5% [14], while [15] detects the presence of four compounds including curcumin 61-67%, 26% demetoksikurkumin, bisdemetoksikurkumin 1-3% and 10-11% in the derivative kurkuminoid ginger.

As additional information, because presence of the specific odor in the mixture used is preferably predators than if turmeric and ginger are not mixed with sambiloto. The response of insects to the odor depends on the quality and quantity of stimuli, as well as insects condition at the time of stimulation. [16] suggested that the odor was caught by the olfactory organs of the insects will be responded in the form of foraging behavior, by using the senses of sight, hearing and sense of odor.

Feeding ability of a pair predators over three days ranged from 4.75 to 6.75 mg and most feed pellets are mixed with sambiloto and turmeric in Figure 1. This is presumably because a substance is produced and able to stimulate predators to eat because if only pellets mixed with turmeric alone or sambiloto only, it seems less edible. The phenomenon may also be due to pellet mixed dark yellow turmeric and sambiloto when mixed will be dark green. The predator adults distaste to eat pellets mixed with turmeric only suspected because the chemical components contained in turmeric such as essential oils, starch, resin, cellulose and some minerals. A compound derived from turmeric essential oil which belong to the class of sesquiterpenes are: turmerone, turmerol, ar-turmeron, curlon, and ar-curcumin.

On Table 1 and Figure 1 seems that the more often predators come to pellet then tend more and more pellets are eaten. It also appears that the more active of female foraging than male that will accumulates on the number of pellets eaten. The females more often visit the pellets mixed with sambiloto+turmeric and ginger. Although statistically show not differences among the treatments sambiloto+turmeric, babadotan+ginger, sambiloto+ginger, ginger, sambiloto and babadotan, it can generally be stated that the level of preference and feeding ability of predators was better if pellets are added ginger rhizome flour mixed with babadotan or sambiloto leaves flour. However , it is expected that the pellets could be beneficial to the conservation of predators Coccinella spp. in rice crops. According to [17], combining habitat management, particularly as it pertains to the provision of non-prey foods, with the initial release and subsequent

integration of the natural enemy into a recipient region will eliminate one causatifactor for the occasional failure of biological control.

CONCLUSIONS

The addition of natural preservatives was positive effect on the attractiveness and feeding ability of predator Coccinella sp. The male more often come in pellet containing turmeric, while the females was tend to pellet containing ginger.

The feeding ability of adult predators to pellets was highest in pellets added sambiloto + turmeric ie 6.75 mg, but not significant to the treatment babadotan+ginger, sambiloto+ginger, ginger, sambiloto and babadotan.

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